§ 15.321 Specific requirements for asynchronous devices operating in the 1910–1920 MHz and 2390–2400 MHz bands.

(a) Operation shall be contained within either or both of the 1910–1920 MHz and 2390–2400 MHz bands. The emission bandwidth of any intentional radiator operating in these bands shall be no less than 500 kHz.

(b) All systems of less than 2.5 MHz emission bandwidth shall start searching for an available spectrum window within 3 MHz of the band edge at 1910, 1920, 2390, or 2400 MHz while systems of more than 2.5 MHz emission bandwidth will first occupy the center half of the band. Devices with an emission bandwidth of less than 1.0 MHz may not occupy the center half of the band if other spectrum is available.

(c) Asynchronous devices must incorporate a mechanism for monitoring the spectrum that its transmission is intended to occupy. The following criteria must be met:

(1) Immediately prior to initiating a transmission, devices must monitor the spectrum window they intend to use for at least 50 microseconds.

(2) The monitoring threshold must not be more than 32 dB above the thermal noise power for a bandwidth equivalent to the emission bandwidth of the device.

(3) If no signal above the threshold level is detected, a transmission burst may commence in the monitored spectrum window. Once a transmission burst has started, an individual device or a group of cooperative devices is not required to monitor the spectrum window provided the intraburst gap timing requirement specified below is not exceeded.

(4) After completion of a transmission, an individual device or cooperating group of devices must cease transmission and wait a deference time randomly chosen from a uniform random distribution ranging from 50 to 750 microseconds, after which time an attempt to access the band again may be initiated. For each occasion that an access attempt fails after the initial inter-burst interval, the range of the deference time chosen shall double until an upper limit of 12 milliseconds is reached. The deference time remains at the upper limit of 12 milliseconds until an access attempt is successful. The deference time is re-initialized after each successful access attempt.

(5) The monitoring system bandwidth must be equal to or greater than the emission bandwidth of the intended transmission and shall have a maximum reaction time less than 50×SQRT(1.25/emission bandwidth in MHz) microseconds for signals at the applicable threshold level but shall not be required to be less than 50 microseconds. If a signal is detected that is 6 dB or more above the threshold level, the maximum reaction time shall be 35×SQRT(1.25/emission bandwidth in MHz) microseconds but shall not be required to be less than 35 microseconds.

(6) The monitoring system shall use the same antenna used for transmission, or an antenna that yields equivalent reception at that location.

(7) Devices that have a power output lower than the maximum permitted under the rules may increase their detection threshold by one decibel for each one decibel that the transmitter power is below the maximum permitted.

(d) Emissions shall be attenuated below a reference power of 112 milliwatts as follows: 30 dB between the sub-band edges and 1.25 MHz above or below the sub-band; 50 dB between 1.25 and 2.5 MHz above or below the sub-band; and 60 dB at 2.5 MHz or greater above or below the sub-band. Compliance with the emissions limits is based on the use of measurement instrumentation employing a peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

(e) The frequency stability of the carrier frequency of intentional radiators operating in accordance with this section shall be ±10 ppm over 10 milliseconds or the interval between channel access monitoring, whichever is shorter. The frequency stability shall be maintained over a temperature variation of −20° to +50 °Celsius at normal supply voltage, and over a variation in the primary supply voltage of 85 percent to 115 percent of the rated supply voltage at a temperature of 20 degrees

Celsius. For equipment that is capable of operating only from a battery, the frequency stability tests shall be performed using a new battery without any further requirement to vary supply voltage.

(f) An asynchronous transmission burst is a series of transmissions from one or more transmitters acting cooperatively. The transmission burst duration from one device or group of devices acting cooperatively shall be no greater than 10 milliseconds. Any intraburst gap between cooperating devices shall not exceed 25 microseconds.

(g) Operation of devices in the 2390–2400 MHz band from aircraft while airborne is prohibited, in order to protect space research operations at the National Astronomy and Ionospheric Center at Arecibo, Puerto Rico.

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§ 15.323 Specific requirements for isochronous devices operating in the 1920–1930 MHz sub-band.

(a) Operation shall be contained within one of eight 1.25 MHz channels starting with 1920–1921.25 MHz and ending with 1928.75–1930 MHz. Further subdivision of a 1.25 MHz channel is permitted with a reduced power level, as specified in §15.319(c), but in no event shall the emission bandwidth be less than 50 kHz.

(b) Intentional radiators with an intended emission bandwidth less than 625 kHz shall start searching for an available time and spectrum window within 3 MHz of the sub-band edge at 1920 MHz and search upward from that point. Devices with an intended emission bandwidth greater than 625 kHz shall start searching for an available time and spectrum window within 3 MHz of the sub-band edge at 1930 MHz and search downward from that point.

(c) Isochronous devices must incorporate a mechanism for monitoring the time and spectrum windows that its transmission is intended to occupy. The following criteria must be met:

(1) Immediately prior to initiating transmission, devices must monitor the combined time and spectrum windows in which they intend to transmit for a period of at least 10 milliseconds for systems designed to use a 10 milliseconds or shorter frame period or at least 20 milliseconds for systems designed to use a 20 milliseconds frame period.

(2) The monitoring threshold must not be more than 30 dB above the thermal noise power for a bandwidth equivalent to the emission bandwidth used by the device.

(3) If no signal above the threshold level is detected, transmission may commence and continue with the same emission bandwidth in the monitored time and spectrum windows without further monitoring. However, occupation of the same combined time and spectrum windows by a device or group of cooperating devices continuously over a period of time longer than 8 hours is not permitted without repeating the access criteria.

(4) Once access to specific combined time and spectrum windows is obtained an acknowledgment from a system participant must be received by the initiating transmitter within one second or transmission must cease. Periodic acknowledgments must be received at least every 30 seconds or transmission must cease. Channels used exclusively for control and signaling information may transmit continuously for 30 seconds without receiving an acknowledgment, at which time the access criteria must be repeated.

(5) If access to spectrum is not available as determined by the above, and a minimum of 40 duplex system access channels are defined for the system, the time and spectrum windows with the lowest power level below a monitoring threshold of 50 dB above the thermal noise power determined for the emission bandwidth may be accessed. A device utilizing the provisions of this paragraph must have monitored all access channels defined for its system within the last 10 seconds and must verify, within the 20 milliseconds (40 milliseconds for devices designed to use a 20 milliseconds frame period) immediately preceding actual channel access that the detected power of the selected time and spectrum windows is no higher than the previously detected value. The power measurement resolution for